

## **CLAIMS**

We claim:

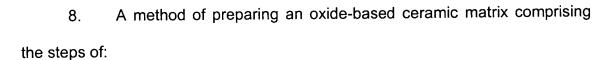
An oxide based ceramic matrix comprising: 1.

a sol-gel matrix comprising from about 10 wt% to about 25 wt% of metal oxide solids; and

alumina particles;

wherein the sol-gel matrix comprises from about 40 wt% to about 70 wt% of the matrix and the alumina particles comprise from about 30 wt% to about 60 wt% of the matrix.

- 2. The ceramic matrix of Claim 1 wherein the sol-gel matrix is selected from the group consisting of alumina sol, alumina-coated silica sol and silica sol.
- 3. The ceramic matrix of Claim 2 wherein the ceramic matrix comprises from about 0 wt% to about 33 wt% of the silica.
- 4. The ceramic matrix of Claim 3 wherein the ceramic matrix comprises from about 5 wt% to about 10 wt% of the silica.
- 5. The ceramic matrix of Claim 1 wherein the alumina particles have a size of from about 0.1  $\mu m$  to about 1.5  $\mu m$ .
- 6. The ceramic matrix of Claim 1 wherein the ceramic matrix further comprises a filler material.
  - 7. The ceramic matrix of Claim 6 wherein the filler material is mullite.

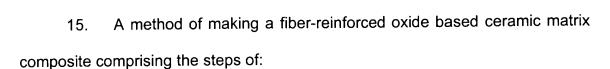


providing a sol-gel matrix, wherein the sol-gel matrix comprises from about 10 wt% to about 25 wt% of metal oxide solids;

mixing the alumina particles into the sol-gel to form the ceramic matrix wherein the alumina particles comprise from about 30 wt% to about 60 wt% of the ceramic matrix; and

if necessary, adjusting the pH to prevent gelling of the ceramic matrix.

- 9. The method of Claim 8 wherein the sol-gel is selected from the group consisting of alumina sol, silica sol and alumina-coated silica sol.
- 10. The method of Claim 8 wherein the alumina particles have a size of from about 0.1  $\mu m$  to about 1.5  $\mu m$ .
- 11. The method of Claim 8 wherein the pH of the matrix is adjusted by the addition of an acid.
- 12. The method of Claim 11 wherein the acid is selected from the group consisting of nitric acid, hydrochloric acid and sulfuric acid.
- 13. The method of Claim 8 further comprising the step of treating the mixture to form a homogeneous suspension.
- 14. The method of Claim 13 wherein the homogenous suspension is formed by ball milling, attritor milling, planetory milling or high-shear mixing.



providing a sol-gel matrix, wherein the sol-gel matrix comprises from about 10 wt% to about 25 wt% of metal oxide solids;

mixing the alumina particles into the sol-gel to form a ceramic matrix wherein the alumina particles comprise from about 30 wt% to about 60 wt% of the ceramic matrix;

adjusting the pH to prevent gelling of the ceramic matrix, if necessary;

treating the ceramic matrix to form a homogenous suspension; and infiltrating the homogeneous suspension into a ceramic fabric.

- 16. The method of Claim 15 wherein the sol-gel matrix is selected from the group consisting of alumina sol, silica sol and alumina-coated silica sol.
- 17. The method of Claim 15 wherein the alumina particles have a size of from about 0.1  $\mu$ m to about 1.5  $\mu$ m.
- 18. The method of Claim 15 wherein the pH of the matrix is adjusted by the addition of an acid.
- 19. The method of Claim 18 wherein the acid is selected from the group consisting of nitric acid, hydrochloric acid and sulfuric acid.
- 20. The method of Claim 15 wherein the homogenous suspension is formed by ball milling, attritor milling, planetory milling or high-shear mixing.
- 21. The method of Claim 15 wherein the method further comprises the steps of calcining the infiltrated preform and sintering the infiltrated preform.
- 22. The method of Claim 21 wherein the method further comprises the step of repeating the infiltrating step and the calcining step.